What is claimed is:

1. A method for generating a substantially sinusoidal waveform containing encoded digital data having one of a first value and a second value at selected phase angles $\theta_n$ comprising:

generating the waveform having an amplitude $Y$ defined by a first function at phase angles lying outside of regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$, said first function being $Y=sin\theta$;

generating the waveform having an amplitude $Y$ defined by said first function at phase angles lying inside said regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$ where data of the first value is to be encoded; and

generating the waveform having an amplitude $Y$ defined by a second function at phase angles lying inside said regions having a range of $\Delta\theta$ associated with each phase angle $\theta_n$ where data of the second value is to be encoded, said second function being different from $Y=sin\theta$.

2. The method of claim 1 wherein the number of selected phase angles $\theta_n$ is variable.

3. The method of claim 1 wherein the number of selected phase angles $\theta_n$ is dynamically variable during a communication in response to feedback from an apparatus receiving said waveform.

4. The method of claim 1 wherein the number of selected phase angles $\theta_n$ is dynamically variable during a communication in response to negotiation with an apparatus receiving said waveform.

5. The method of claim 1 wherein the value of each of said selected phase angles $\theta_n$ is variable.

6. The method of claim 1 wherein the value of at least one of said selected phase angles $\theta_n$ is altered for an interval of time to identify an event.

7. The method of claim 1 wherein the value of at least one of said selected phase angles $\theta_n$ is altered for an interval of time to encode an additional data bit.

8. A method for generating a substantially sinusoidal waveform containing encoded digital data having one of a first value and a second value at selected phase angles $\theta_n$ comprising:

generating the waveform having an amplitude $Y$ defined by a first function at phase angles lying outside of regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$, said first function being $Y=sin\theta$;

generating the waveform having an amplitude $Y$ defined by said first function at phase angles lying inside said regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$ where data of the first value is to be encoded; and

generating the waveform having an amplitude $Y$ defined by a second function at phase angles lying inside said regions having a range of $\Delta\theta$ associated with each phase angle $\theta_n$ where data of the second value is to be encoded, said second function being one of $Y=sin\theta_n$ and $Y=sin\theta_{(n+\Delta\theta)}$.

9. The method of claim 8 wherein the number of selected phase angles $\theta_n$ is variable.

10. The method of claim 8 wherein the number of selected phase angles $\theta_n$ is dynamically variable during a communication in response to feedback from an apparatus receiving said waveform.

11. The method of claim 8 wherein the number of selected phase angles $\theta_n$ is dynamically variable during a communication in response to negotiation with an apparatus receiving said waveform.

12. The method of claim 8 wherein the value of at least one of said selected phase angles $\theta_n$ is variable.

13. The method of claim 8 wherein the value of at least one of said selected phase angles $\theta_n$ is altered for an interval of time to identify an event.

14. The method of claim 8 wherein the value of at least one of said selected phase angles $\theta_n$ is altered for an interval of time to encode an additional data bit.

15. A method for generating a plurality of substantially sinusoidal waveforms each having a different frequency and containing encoded digital data having one of a first value and a second value at selected phase angles $\theta_n$ comprising:

generating each waveform having an amplitude $Y$ defined by a first function at phase angles lying outside of regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$, said first function being $Y=sin\theta$;

generating each waveform having an amplitude $Y$ defined by said first function at phase angles lying inside said regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$ where data of the first value is to be encoded; and

generating each waveform having an amplitude $Y$ defined by a second function at phase angles lying inside said regions having a range of $\Delta\theta$ associated with each phase angle $\theta_n$ where data of the second value is to be encoded, said second function being different from $Y=sin\theta$.

16. The method of claim 15 wherein the number of selected phase angles $\theta_n$ for each waveform is variable.

17. The method of claim 15 wherein the number of selected phase angles $\theta_n$ for each waveform is dynamically variable during a communication in response to feedback from an apparatus receiving said each waveform.

18. The method of claim 15 wherein the number of selected phase angles $\theta_n$ for each waveform is dynamically variable during a communication in response to negotiation with an apparatus receiving said each waveform.

19. The method of claim 15 wherein the value of at least one of said selected phase angles $\theta_n$ in at least one of said waveforms is altered for an interval of time to identify an event.

20. The method of claim 15 wherein the value of at least one of said selected phase angles $\theta_n$ in at least one of said waveforms is altered for an interval of time to encode an additional data bit.

21. A method for generating a plurality of substantially sinusoidal waveforms each having a different frequency and containing encoded digital data

having one of a first value and a second value at selected phase angles $\theta_n$ comprising:

generating each waveform having an amplitude $Y$ defined by a first function at phase angles lying outside of regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$, said first function being $Y=sin\theta$;

generating each waveform having an amplitude $Y$ defined by said first function at phase angles lying inside said regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$ where data of the first value is to be encoded; and

generating each waveform having an amplitude $Y$ defined by a second function at phase angles lying inside said regions having a range of $\Delta\theta$ associated with each phase angle $\theta_n$ where data of the second value is to be encoded, said second function being one of $Y=sin\theta_n$ and $Y=sin\theta_{(n+\Delta\theta)}$.

22. The method of claim 21 wherein the number of selected phase angles $\theta_n$ for each waveform is variable.

23. The method of claim 21 wherein the number of selected phase angles $\theta_n$ for each waveform is dynamically variable during a communication in response to feedback from an apparatus receiving said each waveform.

24. The method of claim 21 wherein the number of selected phase angles $\theta_n$ for each waveform is dynamically variable during a communication in response to negotiation with an apparatus receiving said each waveform.

25. The method of claim 21 wherein the value of at least one of said selected phase angles $\theta_n$ in at least one of said waveforms is altered for an interval of time to identify an event.

26. The method of claim 21 wherein the value of at least one of said selected phase angles $\theta_n$ in at least one of said waveforms is altered for an interval of time to encode an additional data bit.

27. A method for decoding information from a substantially sinusoidal waveform containing encoded digital data at selected phase angles $\theta_n$, the waveform having an amplitude $Y=sin\theta$ at phase angles lying outside of regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$, the waveform having an amplitude $Y=sin\theta$ at phase angles lying inside the regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$ where data of the first value is to be encoded, the waveform having an amplitude $Y$ defined by a different from $Y=sin\theta$ at phase angles lying inside the regions having a range of $\Delta\theta$ associated with each phase angle $\theta_n$ where data of the second value is to be encoded, comprising:

receiving the sinusoidal waveform containing encoded digital data;

generating a reference sinusoidal waveform from said substantially sinusoidal waveform containing encoded digital data, said reference sinusoidal waveform having a constant phase relationship with said sinusoidal waveform containing encoded digital data;

mixing said reference sinusoidal waveform and said substantially sinusoidal waveform containing encoded digital data in a balanced mixer; and

extracting said encoded digital data from said balanced mixer.

28. A method for decoding information from a substantially sinusoidal waveform containing encoded digital data at selected phase angles $\theta_n$, the waveform having an amplitude $Y=sin\theta$ at phase angles lying outside of regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$, the waveform having an amplitude $Y=sin\theta$ at phase angles lying inside the regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$ where data of the first value is to be encoded, the waveform having an amplitude $Y$ defined by a different from $Y=sin\theta$ at phase angles lying inside the regions having a range of $\Delta\theta$ associated with each phase angle $\theta_n$ where data of the second value is to be encoded, comprising:

receiving the sinusoidal waveform containing encoded digital data;

digitizing said sinusoidal waveform containing encoded digital data;

generating a digital reference sinusoidal waveform having a constant phase relationship with said sinusoidal waveform containing encoded digital data; and

performing inverse fast fourier transform digital signal processing on said reference sinusoidal waveform and said substantially sinusoidal waveform containing encoded digital data.

29. A communications system for communicating in a communications medium and comprising:

a first station including:

an encoder for generating at least one substantially sinusoidal waveform containing encoded digital data at selected phase angles $\theta_n$, the waveform having an amplitude $Y=sin\theta$ at phase angles lying outside of regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$, the waveform having an amplitude $Y=sin\theta$ at phase angles lying inside the regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$ where data of the first value is to be encoded, the waveform having an amplitude $Y$ defined by a different from $Y=sin\theta$ at phase angles lying inside the regions having a range of $\Delta\theta$ associated with each phase angle $\theta_n$ where data of the second value is to be encoded; and

a transmitter for transmitting said at least one substantially sinusoidal waveform containing encoded digital data through said medium;

a second station coupled to said first station through said communications medium and including:

a receiver for receiving said at least one substantially sinusoidal waveform containing encoded digital data through said medium from said first station; and

a decoder for extracting said digital data from said at least one substantially sinusoidal waveform containing encoded digital data.

30. The communications system of claim 29 wherein said communications medium is a wire system.

31. The communications system of claim 29 wherein said communications medium is a telephone system.

32 The communications system of claim 29 wherein said communications medium is a power distribution system.

33. The communications system of claim 29 wherein said communications medium is a coaxial cable.

34. The communications system of claim 33 wherein said communications medium is a cable television system.

35. The communications system of claim 29 wherein said communications medium is a terrestrial wireless channel.

36. The communications system of claim 35 wherein said communications medium is a radio frequency channel.

37. The communications system of claim 35 wherein said communications medium is a television channel.

38. The communications system of claim 29 wherein said communications medium is a microwave link.

39. The communications system of claim 38 wherein said first station is an earth station and said second station is extraterrestrial.

40. The communications system of claim 39 wherein said second station is on board a spacecraft.

41. The communications system of claim 39 wherein said second station is a satellite.

42. The communications system of claim 29 further including:

a third station coupled to said second station through said communications medium and including:

a receiver for receiving said substantially sinusoidal waveform containing encoded digital data through said medium; and

a decoder for extracting said digital data from said substantially sinusoidal waveform containing encoded digital data.

and wherein said second station further includes a transmitter for transmitting said substantially sinusoidal waveform containing said encoded digital data through said medium to said third station.

43. The method of claim 29 wherein the number of selected phase angles $\theta_n$ for each waveform is variable.

44. The method of claim 29 wherein the number of selected phase angles $\theta_n$ for each waveform is dynamically variable during a communication in response to feedback from a receiving apparatus receiving said each waveform.

45. The method of claim 29 wherein the number of selected phase angles $\theta_n$ for each waveform is dynamically variable during a communication in response to negotiation with a receiving apparatus receiving said each waveform.

46. The method of claim 29 wherein the value of at least one of said selected phase angles $\theta_n$ in at least one of said waveforms is altered for an interval of time to identify an event.

47. The method of claim 29 wherein the value of at least one of said selected phase angles $\theta_n$ in at least one of said waveforms is altered for an interval of time to encode an additional data bit.

48. A communications system for communicating in a communications medium and comprising:

a first station;

a second station coupled to said first station through said communications medium:

wherein said first and second stations each include:

an encoder for generating at least one substantially sinusoidal waveform containing encoded digital data at selected phase angles $\theta_n$, the waveform having an amplitude $Y=sin\theta$ at phase angles lying outside of

regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$, the waveform having an amplitude $Y=sin\theta$ at phase angles lying inside the regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$ where data of the first value is to be encoded, the waveform having an amplitude $Y$ defined by a different from $Y=sin\theta$ at phase angles lying inside the regions having a range of $\Delta\theta$ associated with each phase angle $\theta_n$ where data of the second value is to be encoded;

a transmitter for transmitting said at least one substantially sinusoidal waveform containing encoded digital data through said medium;

a receiver for receiving said at least one substantially sinusoidal waveform containing encoded digital data through said medium; and

a decoder for extracting said digital data from said at least one substantially sinusoidal waveform containing encoded digital data.

49. The communications system of claim 48 wherein said communications medium is a wire system.

50. The communications system of claim 48 wherein said communications medium is a telephone system.

51. The communications system of claim 49 wherein said communications medium is a power distribution system.

52. The communications system of claim 48 wherein said communications medium is a coaxial cable.

53. The communications system of claim 52 wherein said communications medium is a cable television system.

54. The communications system of claim 48 wherein said communications medium is a terrestrial wireless channel.

55. The communications system of claim 54 wherein said communications medium is a radio frequency channel.

56. The communications system of claim 54 wherein said communications medium is a television channel.

57. The communications system of claim 54 wherein said communications medium is a microwave link.

58. The communications system of claim 48 wherein said first station is an earth station and said second station is extraterrestrial.

59. The communications system of claim 58 wherein said second station is on board a spacecraft.

60. The communications system of claim 58 wherein said second station is a satellite.

61. The communications system of claim 48 further including:

a third stationpled to said second station through said communications medium and including:

a receiver for receiving said substantially sinusoidal waveform containing encoded digital data through said medium; and

a decoder for extracting said digital data from said substantially sinusoidal waveform containing encoded digital data.

and wherein said second station further includes a transmitter for transmitting said substantially sinusoidal waveform containing encoded digital data through said medium to said third station.

62. The method of claim 48 wherein the number of selected phase angles $\theta_n$ for each waveform is variable.

63. The method of claim 48 wherein the number of selected phase angles $\theta_n$ for each waveform is dynamically variable during a communication in response to feedback from a receiving apparatus receiving said each waveform.

64. The method of claim 48 wherein the number of selected phase angles $\theta_n$ for each waveform is dynamically variable during a communication in response to negotiation with a receiving apparatus receiving said each waveform.

65. The method of claim 48 wherein the value of at least one of said selected phase angles $\theta_n$ in at least one of said waveforms is altered for an interval of time to identify an event.

66. The method of claim 48 wherein the value of at least one of said selected phase angles $\theta_n$ in at least one of said waveforms is altered for an interval of time to encode an additional data bit.

67. Apparatus for generating a substantially sinusoidal waveform containing encoded digital data having one of a first value and a second value at selected phase angles $\theta_n$ comprising:

means for generating the waveform having an amplitude $Y$ defined by a first function at phase angles lying outside of regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$, said first function being $Y=sin\theta$;

means for generating the waveform having an amplitude $Y$ defined by said first function at phase angles lying inside said regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$ where data of the first value is to be encoded; and

means for generating the waveform having an amplitude $Y$ defined by a second function at phase angles lying inside said regions having a range of $\Delta\theta$ associated with each phase angle $\theta_n$ where data of the second value is to be encoded, said second function being different from $Y=sin\theta$.

68. The apparatus of claim 67 further including means for changing the number of selected phase angles $\theta_n$.

69. The apparatus of claim 67 further including means for dynamically varying the number of selected phase angles $\theta_n$ during a communication in response to feedback from an apparatus receiving said waveform.

70. The apparatus of claim 67 further including means for dynamically varying the number of selected phase angles $\theta_n$ during a communication in response to negotiation with an apparatus receiving said waveform.

71. The apparatus of claim 67 further including means for varying the value of each of said selected phase angles $\theta_n$.

72. The apparatus of claim 67 further including means for altering the value of at least one of said selected phase angles $\theta_n$ for an interval of time to identify an event.

73. The apparatus of claim 67 further including means for altering the value of at least one of said selected phase angles $\theta_n$ for an interval of time to encode an additional data bit.

74. Apparatus for generating a substantially sinusoidal waveform containing encoded digital data having one of a first value and a second value at selected phase angles $\theta_n$ comprising:

generating the waveform having an amplitude $Y$ defined by a first function at phase angles lying outside of regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$, said first function being $Y=sin\theta$;

generating the waveform having an amplitude $Y$ defined by said first function at phase angles lying inside said regions having a range of $\Delta\theta$ beginning at each phase angle $\theta_n$ where data of the first value is to be encoded; and

generating the waveform having an amplitude $Y$ defined by a second function at phase angles lying inside said regions having a range of $\Delta\theta$ associated with each phase angle $\theta_n$ where data of the second value is to be encoded, said second function being one of $Y=sin\theta_n$ and $Y=sin\theta_{(n+\Delta\theta)}$.

75. The apparatus of claim 74 further including means for changing the number of selected phase angles $\theta_n$.

76. The apparatus of claim 74 further including means for dynamically varying the number of selected phase angles $\theta_n$ during a communication in response to feedback from an apparatus receiving said waveform.

77. The apparatus of claim 74 further including means for dynamically varying the number of selected phase angles $\theta_n$ during a communication in response to negotiation with an apparatus receiving said waveform.

78. The apparatus of claim 74 further including means for varying the value of each of said selected phase angles $\theta_n$.

79. The apparatus of claim 74 further including means for altering the value of at least one of said selected phase angles $\theta_n$ for an interval of time to identify an event.

80. The apparatus of claim 74 further including means for altering the value of at least one of said selected phase angles $\theta_n$ for an interval of time to encode an additional data bit.